SmartCraft

for the

Northstar *6000i*

Operation and Installation Manual

for software version 4.00 and greater

SmartCraft is a registered trademark of BNT Mototron

Northstar is a brand name of Brunswick New Technologies Marine Electronics (BNTME)

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Warning:

Engine data and faults displayed by this device are for the convenience of the user. Always consult your dealer for definitive and accurate engine fault diagnosis.

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SmartCraft introduction

The SmartCraft system provides a wealth of real-time information about the physical systems on your vessel, including engines, tanks and trim settings. When properly installed and calibrated, SmartCraft displays and manages data such as engine RPM, oil pressure, and many other items.

Most readings are shown as traditional analog gauges that are easy to read and interpret. Others, such as gear position, are shown as pictorial representations.

Displaying SmartCraft data

Once SmartCraft is properly configured by your dealer, just press the **STAR** key to display a full screen of data. Most data is displayed as traditional analog gauges, in some cases with a small digital readout at the bottom of the each gauge. Data can be displayed in metric or English units, as determined by the Distance/Speed units selection on the Display Options screen.

Three SmartCraft screens can be selected by pressing the menu keys.

- Engine Screen — the primary display, showing the data you need for normal use
- Docking Screen — displays information for docking and maneuvering
- Tanks Screen — displays gauges indicating the levels of fuel, water and waste tanks (if sensors are installed).

Select the desired screen by pressing the appropriate menu key on the SmartCraft screen. The menu key for the selected screen

is displayed in red; others are blue. Other **STAR** key functions are still available from additional presses of the **STAR** key.

If an engine is shut off, or if SmartCraft data is missing for any other reason, the gauge needles disappear, digital readouts display no data, and an alarm is raised.

The primary screens

Engine screen

See “Configuring the screens” on page 5 for choosing which gauges are displayed on the engine screen.

Analog gauges

Most data is displayed on an analog gauges using a traditional needle and a small digital readout at the bottom of the gauge. The gauge is labelled with the data type, and the units of measure are shown on the gauge.

Sync gauge

On a dual-engine system, the engine sync needle indicates the RPM difference between the two engines. Adjust engine speed until the needle is centered.

Trim gauge and popup

The trim gauge indicates the angle of the engine/propellor. Trim may be displayed on the screen, or can be configured to appear as a popup gauge whenever it changes by a designated amount. The gauge dial displays the operating range of the trim setting as readings from 0 to 10, covering 2/3 of the dial. The remaining

third of the dial indicates the trailer positions of the trim (readings from 10 to 25).

Trim popup gauge

Gear position

The gear position indicator shows whether the transmission is in gear or in neutral, and, for some systems, whether in forward or reverse gear.

Gear position

Docking screen

See “Configuring the screens” on page 5 for choosing which gauges are displayed on the docking screen.

The docking screen is designed to show information needed for docking and other close maneuvering. Depending on the installation and engine type, the docking screen can display RPM, gear position, steering angle, depth, SOG, pitot speed, paddle wheel speed, and a video window.

Tanks screen

See “Configuring the screens” on page 5 for choosing which gauges are displayed on the tanks screen.

The tanks screen shows the fluid level of fuel, oil, water, and/or waste tanks. Level may be shown in gallons, liters, or percentage, depending on the configuration (only percentage readings are available if a tank has not been calibrated).

Tanks levels should be calibrated during system installation, as described later.

Vessels with multiple *6000i* control heads

If your *6000i* system has more than one control head installed, you should be aware of the following:

The SmartCraft system is interfaced to one particular *6000i* in your network. That *6000i* must be turned on to broadcast the data to the other control heads. If it’s not on, a message will be displayed on other heads when you try to display the unavailable SmartCraft data. Just turn the interfaced head on, and data will soon be available.

Configuring the screens

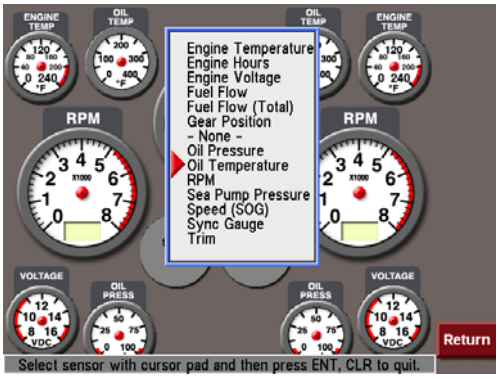
The SmartCraft system automatically configures itself appropriately for the types of engines on your vessel. You can change the content of each gauge or remove gauges from the screens, to meet your needs.

Configuring the gauge data for a SmartCraft screen:

1. Display the screen to be configured by pressing **STAR** followed by the menu key for the desired screen.
2. Press **Config**.

   One gauge on the screen blinks to show that it is selected for configuration.
3. Press the cursor pad to highlight the gauge you want to change and press **Gauge setup**.

   A list of available data for that gauge is displayed.



Configuring the screen

4. Press the cursor pad up or down to select the desired data for that gauge. To remove a gauge from the screen, select "**– None –**" from the list.
5. Press **ENTER**.

   Continue for each gauge you want to change.

   If you are configuring a gauge for data that applies to two engines, configure it for one side and the same gauge data will be shown on the opposite side of the screen.
6. When finished, press **Return**.

To set the color of the background:

1. Display any SmartCraft screen as described above.
2. Press **Background** repeatedly until the desired color is displayed.

Selecting day mode or night mode:

1. Display any SmartCraft screen as described above.
2. Press **Config**.
3. Press **Day mode** or **Night mode**, as appropriate.

Other SmartCraft options

Other, less used, SmartCraft options are accessed by pressing the **STAR** key several times to display the *Setup / Options* screen. You can read more details about these functions in the Setup and Calibration section of this manual. A summary is given below.

On this screen, press **SmartCraft options...** to display the SmartCraft options screen. With this screen, you can turn the main SmartCraft display on or off and access engine faults and SmartCraft setup functions. The following menu keys are displayed:

- **SmartCraft screen On/Off** — turn the SmartCraft display on or off
- **Engine** — set number of engines, and display engine faults
- **Tanks setup** — configure tanks
- **Vessel setup** —calibrate the steering angle, trim and speed sensors
- **Save/Load** —save or restore a SmartCraft configuration
- **Return** — go back to the previous page

SmartCraft screen

Press to turn the main SmartCraft screen on or off.

> **If turned on, the SmartCraft screen is displayed as the first press of the STAR key on this control head.**

Tanks setup

With this screen, you can specify the function of system tanks, set their capacities, and calibrate the sensors. See "Tanks setup" on page 14.

Engine

This screen shows options for entering the number of engines on the vessel, and displaying any active engine faults and the fault history.

The Active Faults screen displays any faults that are currently present. If there are more than 11 faults, press the cursor pad to scroll the list to see more.

The criticality of each fault is displayed at the left, as Critical (red), Severe (orange), Warn (yellow), Caution (black), and Info (blue).

To display the details of any fault, select it with the cursor pad and press **Details**.

The Fault History screen is similar, except that it displays past faults along with the times of occurrence of each fault.

Save/Load

See the Setup and Calibration section of this manual.

Additional Info bars

When the SmartCraft system is installed, two additional info bars can be displayed on the Chart screen.

One info bar displays Engine RPM, Depth (if available) and COG.

The second info bar displays Sea Pump Pressure, Oil Pressure (or Oil Level for outboard engines), Voltage and Fuel Flow.

SmartCraft alarms

SmartCraft alarms are sounded regardless of whether or not the SmartCraft screen is enabled for display. A gauge that is reporting an alarm condition will display with a red bezel. In addition, a standard *6000i* alarm will be displayed and sounded.

The fourth menu key on primary SmartCraft screens displays current SmartCraft alarms.

On the *6000i's* alarms screen, the **Active faults...** menu key displays any available details for SmartCraft alarms. This key is only displayed if there are active faults.

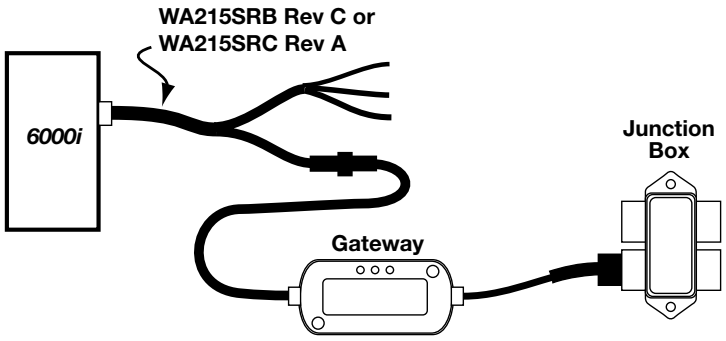
Alarms

Alarm	Meaning
NO ENGINE DATA	No SmartCraft data is being received at this control head.
ENGINE DATA STALE	Some or all components of the engine data from the Gateway are not being received by the head connected to the Gateway.
2 UNITS CONNECT TO ENGINE	More than one networked unit has its RS-232 port set to SMARTCRAFT.
Tank alarms	Check levels for fuel, water or waste tanks
Engine faults	Details are described on Faults screen. (Categorized as Warning, Severe, Critical, or Guardian.)

SmartCraft installation

The SmartCraft system is normally installed and calibrated by your dealer.

The Northstar SmartCraft gateway connects one or two Smart-Craft-capable engines to a Northstar *6000i* navigator. The single gateway is for single engines; the dual gateway is for twin engines. The Gateway must be revision 1.2.3 or higher.



SmartCraft connections

Connecting the Gateway to the engine

Connect cables from the engines and sensors to any ports on the junction box. Connect the Gateway to any available port on the junction box.

Connecting the gateway to the Northstar 6000i

Use a Northstar part no. WA215SRB, Rev C or WA215SRC, Rev A cable to connect between the Gateway and the *6000i*'s NMEA port. This cable also interfaces the *6000i* to other equipment on

the vessel. (The SRB cable can connect to a Northstar 4kW radar, and the SRC cable can connect to a Northstar 2kW radar.)

Connect the Gateway to the RS-232 port of the *6000i*. In a networked installation with multiple control heads, you can connect the Gateway to either the master or a slave unit. (If connected to a slave unit, that unit must be turned on for other networked units to receive SmartCraft data).

Configuring the *6000i* for SmartCraft

Configure the interfaced unit's RS-232 port for SmartCraft as follows:

1. Press the **STAR** key several times to display the *Options/Setup* screen.
2. Press **Port setup options...**
3. Press **Edit** and change the **RS-232 Port Setup** to **SMART-CRAFT**.
4. Press **ENTER**.
5. Start up at least one engine, so that it will transmit SmartCraft data and enable display of SmartCraft data on all networked *6000i's*.
6. Follow the instructions in the *Setup and Calibration* section of this manual, starting on page 13.

Uninstalling SmartCraft

If you should need to remove the SmartCraft displays from a *6000i* installation, just change the RS-232 port of the interfaced unit to something other than SMARTCRAFT.

> If that unit is no longer available, set the RS-232 port of any other networked *6000i* to SMARTCRAFT, and then return it to its original setting.

Setup and Calibration

After SmartCraft data has been received at least once, the SmartCraft setup options are accessed by pressing the **STAR** key several times to display the *Setup / Options* screen.

On this screen, press **SmartCraft options...**

The following menu keys are displayed:

- **Engine** — displays engine faults and allows the user to designate the number of engines on the vessel.
- **Tanks setup** — allows changing tanks configuration
- **Vessel setup** — allows setting up steering angle, trim, speed sensors, etc.
- **Save/Load SmartCraft** - saves or loads the entire SmartCraft configuration to a Compact Flash card
- **Return** — go back to the previous page

Engine

Pressing **Engine** displays a screen with the following options:

Number of engines

If not correct, press 1 or 2 to change it.

Active faults

Press **Active faults** to display a list of any active faults, in order of criticality. Press the cursor pad up or down to select a fault, and press **Details** to display more information about the selected fault.

Fault history

Press **Fault history** to display a list of up to 20 most recent faults, in order of their occurrence (most recent at the top of the list). Press the cursor pad up or down to select a fault, and press **Details** to display more information about the selected fault, including engine run times of reach occurrence.

Engine run times for up to the last five last occurrences of each fault are shown.

Tanks setup

The tank setup screen shows a list of all tanks monitored by the SmartCraft system.

To configure the tanks display, enter the tank type, then the capacity and any alarm condition as follows:

Tank type

When the type field is selected, the following menu keys are displayed:

- **Next** — cycles through tank types: N/A, Fuel, Water and Waste
- **Previous** — cycles through tank types in the opposite direction
- **Turn Alarm on/off** — turns the fluid level alarm on or off
- **Calibrate** — begins the tank calibration procedure, as described below (this key is shown only after the capacity has been entered)

With the cursor pad, move the cursor to each field and set its value. For text fields, press **Next** or **Previous** to step through the choices. For numeric fields, press **Increase** or **Decrease** to step through the values one at a time, or press **Edit** to use the numeric keypad (type the digits and press **ENTER**).

Tank alarms

An alarm can be raised for each tank if the tank level goes above or below a specified level. Turn the alarm on or off by pressing the **Turn Alarm on/off** menu key.

When the alarm is turned on, you can set the level at which the alarm is sounded. For fuel and water tanks, the alarm sounds when the level stays consistently below the specified limit. For the waste tank, the alarm sounds when the level consistently exceeds the specified amount.

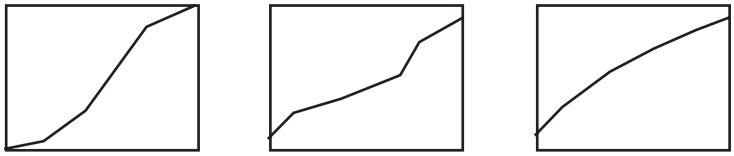
Calibrating the tanks

Since tanks often have irregular shapes, it is strongly recommended that each tank sensor be calibrated using the following procedure.

Start with a completely empty tank, and add 25% of the capacity at a time. Wait 30 seconds for the level reading to stabilize, and then press **Next** after each step. The screen displays how much fluid is required at each step.

1. Select a tank on the *Tank setup* screen and press **Calibrate Tank** to begin the process. On-screen instructions give detailed information.
2. Empty the tank, and press **Next**.
3. Add the number of gallons (or liters) shown to fill the tank to 25% capacity, and press **Next**.
4. Add the number of gallons shown (or fill to the total number of gallons shown) to fill the tank to 50% capacity, and press **Next**.
5. Repeat for 75% and 100%.
6. The system displays a calibration graph so you can verify that the calibration curve is reasonable. An experienced installer may be

able to recognize whether or not the curve shape is correct for any particular tank type.The curve must always increase as it moves to the right. It should look something like one of the following:



7. If the curve looks reasonable, press **Done**. The system asks if you want to save the changes. Press **ENTER** to accept the new calibration, or **CLEAR** to abandon the change.

   If a stuck float or invalid calibration curve is detected by the software, you may be asked to repeat the calibration.

The tank setup screen will now display "Calibrated - Yes" for that tank. When calibrated, the main display screens will display the contents in gallons (or liters). If uncalibrated, the contents level will be shown as a percentage.

Vessel setup

The Vessel setup screen allows configuration of items that relate to the vessel itself. The following menu keys are displayed:

- **Steering angle** — rudder angle calibration
- **Trim** — trim calibration
- **Speed sensors** — speed calibration

Setup steering angle sensor

This screen guides the installation and calibration of a steering angle sensor. Three items may be displayed on the screen (the second and third items are displayed only if the first is set to *Yes*):

- whether or not the sensor is installed (*Yes* or *No*)
- the sensor polarity (*Normal* or *Inverted*)
- the sensor's range (*35°*, *45°* or *60°*)

Use the cursor pad to select an item above, then press **Edit** to allow changes to the item. Use the cursor pad to select the new value, and press **ENTER** to save the new value.

To calibrate the sensor, press **Calibrate**, center the rudder or wheel, and press **ENTER**.

Setup trim

This screen guides the installation and calibration of the vessel's engine trim. Three items may be displayed on the screen (the second and third items are displayed only if the first is set to *Yes*):

- whether or not a trim sensor is installed
- whether or not a popup gauge should be displayed for 10 seconds whenever the trim changes
- the popup filter setting, designating how much trim change is needed to cause the popup display

The gauge dial displays the operating range of the trim setting as readings from 0 to 10, covering 2/3 of the dial. The remaining third of the dial indicates the trailer positions of the trim (readings from 10 to 25).

Trim popup gauge

To calibrate the sensor, press Calibrate. You will be asked to do the following:

1. Set the trim to full down, and press **ENTER**
2. Set the trip to full operating up, and then press **ENTER**.
3. Set the trim to full trailer up, and then press **ENTER**.

Setup speed sensor

This screen guides the installation and calibration of pitot and/or paddle wheel speed sensors. Both sensor types can be installed simultaneously.

Four items may be displayed on the screen (the second and fourth items are displayed only if the appropriate sensor is installed). Select an item with the cursor pad, and press **Edit** to change it.

- pitot type (100 psi, 200 psi, or not installed)
- pitot max speed (10, 20, 50, 100 or 150)

  Press the cursor pad up or down to select the maximum pitot speed to be displayed as full-scale on the gauge.
- paddle type (frequency {5.6Hz/knot} or not installed)

  Many paddle sensors produce an output of 5.6 Hz/knot. This value can be changed, if necessary. If the sensor is installed, the user can use the cursor pad to move the cursor to the frequency value, and then adjust it by pressing the cursor pad up or down.
- paddle maximum speed (10, 20, 50, 100 or 150)

  Press the cursor pad up or down to select the maximum paddle speed to be displayed as full-scale on the gauge.

Save/Load SmartCraft

This function saves or recalls the entire state of the 6000i SmartCraft setup to a Compact Flash card inserted into the slot on the front panel. The function is useful for installers who perform the same installation configuration on multiple vessels with the same engine type.

Note: This function must only be used to load a configuration than applies to the same engine type for which the configuration was stored.

The following menu keys are displayed:

- Save — stores the current configuration in the selected slot
- Load — loads a previously saved configuration from the selected slot
- Delete — removes the selected configuration from the Compact Flash card
- Rename — allows renaming the selected configuration

- Return —goes back to the previous page

Insert a Compact Flash card into the slot (be sure to use a card without any chart data on it). Any configurations previously stored on this card will be displayed on the screen.

First, select a slot with the cursor pad.

To save a configuration, use the keypad and cursor pad to enter a name for the configuration, and press **Save**.

If a configuration had been previously saved in that slot location, the system will ask if you want to overwrite the previously saved configuration.

To load an existing configuration, select it with the cursor pad and press **Load**.

To delete a previously entered configuration, select it with the cursor pad and press **Delete**.

To rename a previously saved configuration, select it with the cursor pad, enter the new name with the keypad and cursor pad and press **Rename**.